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Solution by GEORGE W. HARTWELL, Columbia University, New York.

Dividing by x , $\frac{\partial^2 y}{\partial x^2} + \frac{2}{x} \frac{\partial y}{\partial x} - y = 0 \dots (1)$.

Remove the term containing $\frac{\partial y}{\partial x}$ by substituting $y = \frac{v}{x}$. Then (1) becomes $\frac{\partial^2 v}{\partial x^2} - v = 0 \dots (2)$.

The solution of this equation is $v = c_1 e^x + c_2 e^{-x}$. $\therefore xy = (c_1 e^x + c_2 e^{-x})$.

Solved in a similar manner by G. B. M. Zerr.

248. Proposed by REV. R. D. CARMICHAEL, Anniston, Ala.

Evaluate $\int_0^{\frac{1}{2}\pi} \sin nx \cot x dx$, where n is a positive integer.

Solution by G. B. M. ZERR, A. M., Ph. D., 4243 Girard Avenue, Philadelphia, Pa.

$$\begin{aligned}
 A &= \int_0^{\frac{1}{2}\pi} \sin nx \cot x dx = \int_0^{\frac{1}{2}\pi} \frac{\sin(n-1)x dx}{\sin x} + \int_0^{\frac{1}{2}\pi} \cos nx dx \\
 &= 2 \int_0^{\frac{1}{2}\pi} [\cos x + \cos 3x + \cos 5x + \dots + \cos(n-3)x] dx + \int_0^{\frac{1}{2}\pi} \cos nx dx \\
 &= 2 \left[\sin x + \frac{1}{3} \sin 3x + \frac{1}{5} \sin 5x + \dots + \frac{1}{n-3} \sin(n-3)x \right]_0^{\frac{1}{2}\pi} + \frac{1}{n} \cos \frac{\pi n}{2} \\
 &= 2 \left[1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \dots \pm \frac{1}{n-3} \right] \pm \frac{1}{n}; \text{ for } n \text{ even} = \frac{1}{2}\pi \text{ if } n = \infty. \\
 A &= \int_0^{\frac{1}{2}\pi} [1 + 2\cos 2x + 2\cos 4x + 2\cos 6x + \dots + 2\cos(n-3)x] dx \\
 &+ \int_0^{\frac{1}{2}\pi} \cos nx dx = \left[x + \sin 2x + \frac{1}{2} \sin 4x + \frac{1}{3} \sin 6x + \dots + \frac{2}{n-3} \sin(n-3)x \right]_0^{\frac{1}{2}\pi} \\
 &+ \frac{1}{n} \cos \frac{\pi n}{2} = \frac{1}{2}\pi, \text{ for } n \text{ odd.}
 \end{aligned}$$

249. Proposed by G. B. M. ZERR, A. M., Ph. D., 4243 Girard Avenue, Philadelphia, Pa.

Ike, running with constant velocity v , is trying to catch Jim, running with constant velocity V , ($V > v$), by keeping Jim dead ahead of him. Find their paths.